PATENT APPLICATION PAPERS

OF

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FOR: MOUNTING ARRANGEMENT FOR VEHICLE POWER SOURCE

RELATED APPLICATIONS

This application is a continuing application of Application Serial No. 09/511,252 filed February 23, 2000.

BACKGROUND OF THE INVENTION

1. Field of Invention

The present invention provides a mounting arrangement for a cordless, rechargeable battery driven, hand held power tool, the tool powering a vehicle, such as a scooter.

2. Description of the Prior Art

Various types of electric driven vehicles have been disclosed in the prior art. The most visible of these devices is the battery powered automobile which is currently being tested and could be offered for commercial sale in the near future.

Various types of scooters and bicycles have also been powered by electric batteries. For example, U.S. Patent No. 5,775,452 to Patmont discloses an electric powered scooter wherein the rear wheel is electrically powered; U.S. Patent No.: 5,613,569 to Sugioka et al discloses an electric motor vehicle with a smaller sized battery and means for cooling the battery; U.S. Patent No. 5,842,535 to Dennis discloses a bicycle having a battery power pack, an electric motor, and a drive wheel; U.S. Patent No.: 5,594,411 to Ono discloses an electromotive scooter having a power source and a warning device which warns the rider and passerby when the scooter is ready to run; U.S. Patent No. 5,396,970 to Cho discloses a power source which supplies high voltage to the electric motor driving a scooter to

provide high driving performance; U.S. Patent No. 5,388,659 to Pepe which discloses a foldable motorized scooter having a unique drive transfer device; U.S. Patent No.: 5,207,288 to Ono discloses a lightweight electronic scooter wherein the batteries are positioned to provide a low scooter center of gravity; and U.S. Patent No. 5,020,624 to Nesterick et al which discloses a power drive scooter having an on-board battery powered motor for driving one or more wheels, the scooter being designed to be easily assembled and disassembled.

All of the devices described hereinabove require an electric drive motor to power the vehicle. The drive motor, depending on size, is relatively expensive and requires a specific drive mechanism to link the motor output shaft to the vehicle drive wheel. The cost of servicing the drive motor and associated mechanism, when added to the initial costs of the vehicle, makes the cost of ownership relatively expensive. Further, the typical power output of the batteries which drive the vehicle is usually low, making electric drive vehicles less competitive with internal combustion driven vehicles as far as torque/power capabilities are concerned. In application Serial No. 09/393,070, filed September 7, 1999, a power source for use with electric vehicles which is less expensive and more reliable than those currently available is disclosed and claimed. In particular, a cordless, rechargeable battery-driven hand held power tool is used as the power source for vehicles. Although the concept of using such a power tool for driving a vehicle is believed to be unique, the mounting arrangement for the power source disclosed in the application is not aesthetically or commercially appealing since it extends essentially perpendicular to the axis of the vehicle. Thus, what is desired is to improve upon the power source/mounting arrangement disclosed in the '070 application.

Finally, Patent No. 3,156,315 to Hawgood, cited by the examiner during the prosecution of the

'252 application, discloses a dollie device for manuvering trailers and the like for parking a trailer. The dollie uses an electrically powered hand drill for providing motive power to the dollie. As shown in the drawings, Hawgood contemplates the use of a drill powered by a standard A.C. voltage source and does not contemplate the use of a hand held drill powered by a detachable power pack as disclosed in the '070 application.

The use of a hand held drill powered by a detachable battery pack although providing advantages noted in the '070 application, presents additional problems if used to drive a vehicle that were not addressed in the application. In particular, a user of the vehicle, in order to drive the vehicle, must continually have power applied to the drill or the drill shaft will stop rotating, causing the vehicle, in turn, to stop suddenly. If not prepared, the user could be thrown from the vehicle. Further, momentum will cause the vehicle to continue to move, which in turn may damage the drill motor gears as the vehicle movement is transmitted back to the motor via the vehicle transmission.

What is also desired is to provide a vehicle with a motive force provided by a hand held drill powered by a detachable battery pack, the vehicle having a free wheel assembly to enable the vehicle to move when power is not applied to the drill tool.

SUMMARY OF THE PRESENT INVENTION

The present invention provides a member for mounting a portable power tool to a vehicle, the mounting member comprising a bracket mounted to the vehicle, a collar member integral with the bracket adapted to engage a portion of the tool and position it at an angle to the longitudinal axis of the vehicle, and a member for removably holding the tool in place on the bracket. When mounted, the

power tool chuck engages a rotatable shaft, the shaft in turn being coupled to a gearing system. The rotational speed of the shaft, and thus the speed of the vehicle, is controlled by the vehicle user via hand controls that pull the finger trigger on the power tool. A mechanism is provided which enables the user to push the vehicle without engaging the power tool, thus enhancing tool battery life.

The mounting arrangement of the present invention provides a system that adapts the novel concept of using hand held, battery driven power tool to drive a vehicle into a compact and aesthetically arrangement with enhanced commercial appeal. The power tool can quickly be released, enabling the user to use the power tool independently of the vehicle and the vehicle independently of the power tool. A free wheel assembly for pushing/coasting the vehicle in the forward direction without engaging the power tool is provided, thus increasing power tool battery life.

BRIEF DESCRIPTION OF THE DRAWING

For better understanding of the present invention as well as other objects and further features thereof, reference is made to the following description which is to be read in conjunction with the accompanying drawing therein:

Figure 1 is a front elevational view of a scooter with a mounted power source in accordance with the teachings of the present invention;

Figure 2 is a partial plan view of the scooter of Figure 1 with the foot platform/cover removed to show the transmission and chain drive;

Figure 3 is a detail view along line 3-3 of Figure 1;

Figure 4 is a view of the mounting device with the vehicle power source removed;

Figure 5 is a view along line 5-5 of Figure 4;

Figure 6 is a cross-sectional view along line 6-6 of Figure 4 and illustrates the inline power take off from the power tool to the 90E angle gear and then to the drive sprocket; and

Figure 7 is a plan view of the scooter shown in Figure 1.

DESCRIPTION OF THE INVENTION

Referring now to Figure 1, a vehicle, such as a scooter, 10 is shown with a portable, battery operated power tool 12 mounted to scooter 10 via mounting member 14. Power tool 12 includes a battery pack 13 and trigger 15.

Scooter 10 is, other than the power tool 12 and mounting member 14, conventional and includes front wheel 16, frame member 18, rear wheel 20, vertical extension 22 and handle 24. As shown in Figure 3, handle 24 has braking lever 26 and a throttle control lever 28 mounted thereto. It is noted that the disclosed mounting member 14 can be used in vehicles other than scooter 10.

As will be explained in more detail hereinafter, power tool 12 is mounted to scooter 10 such that it is positioned at an angle to the longitudinal axis of frame member 18 as illustrated. The chuck portion 30 of power tool 12, when mounted, engages a rotatable shaft 32 which in turn is coupled to a gearing system 34. The gearing system 34, shown in more detail in Figures 2 and 6, comprises gears 36 and 38, gear 36 being coupled to shaft 32, drive shaft 40 and gear 38. The rotational movement of shaft 32 is coupled to gear 36, gear 38 transferring the power of tool 12 into a rotational movement in a direction approximately 90B from the rotational direction of gear 36. Gear 38, mounted to shaft 40, drives shaft 40 which in turn drives sprocket 37 which drives belt, or chain, 42. Chain 42, in turn, is

coupled to a sprocket arrangement directly coupled to rear drive wheel 20 and couples the power from power tool 12 thereto. Sprocket 37 is mounted on hub 63 and engages in one direction only by pawls 43. This free wheel assembly 31 is one-directional which allows coasting or drag free coasting in the forward direction without forcing power tool 12 to move with it, thus increasing the power tool battery life. This enables the movement of the vehicle 10 to be power driven or manually pushed and then to coast. The use of a vehicle free-wheel system, although available with certain vehicle ,such as bicycles, has not been used previously in battery powered vehicles of the type disclosed in the pending application noted hereinabove and the mounting arrangement which is the subject of the present invention.

Figure 4 illustrates member 14 without power tool 12 mounted thereto. Mounting member 14 comprises bracket, or frame, member 50, strap 52 being secured to bracket member 50, mounting collar 54 and mounting bolts 56, bolts 56 mounting bracket member 50 to vehicle 10. When the power tool 12 is mounted to vehicle 10, the trigger 15 thereof is positioned in contact with power tool trigger control member 64. The rotational speed, and thus the torque output, of the power tool 12 is controlled by lever 28 on handle 24. In particular, lever 28 controls the position of a lever 64 mounted to bracket member 50 via cable 58 (Figure 5). A user, by adjusting the pressure on member 64 via lever 28, controls the force on power tool trigger 15 which in turn controls the power tool rotational speed/torque coupled to shaft 32, the overall speed of vehicle 10 thus being controlled.

Figure 5 shows in more detail the mounting member 14 and, in particular, releasable locking strap 52 which holds power tool 12 in position on bracket member 50, pivoting fulcrum 61 mounted to bracket member 50 which allows lever 64 to transfer movement through the mounting member 14 to

the power tool variable speed/torque control 15 and mounting collar, or centering ring, 54 which centers power tool 12 when positioned therein, providing a snug fit for holding power tool 12 such that chuck 30 can receive shaft 32

Figure 6 is a view of the in-line power transfer from power tool 12 to the 90E angle gears 36 and 38 to the sprocket 37. Shaft 32 is supported by a first bearing 33 and passes through gear 36 to a second stabilizing shaft bearing 39. Gear 36 is cinched to shaft 32 by pinch bolt 41. Drive gear 38 drives shaft 40. Bearing assemblies 76 and 78, coupled to base plate 72, support shaft 40 as illustrated. A sprocket freewheel assembly 31, comprising hub 63, pawls 43 and sprocket 37 drives chain 42.

The free-wheel system is located within sprocket assembly 31. When shaft 40 rotates in the forward, or clockwise, direction, hub 63 engages pawls 43 with sprocket 37. When the rotational speed of sprocket 37 exceeds that of shaft 40, pawl 43 disengages allowing the sprocket 37 to rotate independently of the hub 63 when the power to tool 12 is on or off, allowing vehicle 10 to coast as set forth hereinabove.

The conventional scooter 10 is modified to incorporate the mounting arrangement of the present invention as follows:

The bracket member 50 is secured to the rear wheel assembly bracket 59 of scooter 10 using fastener members, or bolts, 56 (although bracket member 50 and bracket 59 are shown as separate components, a single, unitary mounting member could be used instead). The gearing system 34 is then secured to frame member 18. The front portion of a battery driven power tool 12, such as the Bosch Model No. 24 Volt Series, distributed by Robert Bosch Corporation, Broadview, Illinois, is then positioned within centering ring 54 such that chuck 30 engages shaft 32 as shown in Figure 1. Chuck

30 is then tightened such that shaft 32 is operatively engaged thereby. It should be noted that gears 36 and 38 are interchangeable and that the gear ratios can be selected to provide the desired vehicle torque output. Further, the actual dimensions of the bracket member 50 may vary depending upon the power tool model utilized. It also should be recognized that other portable, battery driven, hand held power tools can be utilized in the present invention, such as a conventional circular saw (this type of power tool would not require a 90 degree power transfer gearing mechanism since the tool itself provides that feature).

Figure 7 is a plan view of vehicle 10 illustrating the foot platform for the operator 19, which also encompasses a cover for the gearing system 34, chain 42 and rear wheel 20.

While the invention has been described with reference to its preferred embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the true spirit and scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from its essential teachings.